DEFT Programmatic Actions

Work in Progress
For Discussion Purposes Only
September 18, 1998

A. Restore a wide range of depleted habitat types for spawning, rearing, holding, and migrating resident and anadromous fish.

B. Manage the volume, durations, and pathways of flow, nutrient inputs, and other factors to support lower trophic level dynamics in the Delta.

C. Improve screens, screen unscreened diversions, change diversion locations, and consolidate diversions to improve survival of fish at the point of diversions.

D. Change operations to improve survival of fish and to protect and improve appropriate lower level productivity.

E. Establish appropriate environmental cues to improve survival of migratory fish through the Delta.

F. Identify, reduce, eliminate, and/or sequester inputs of toxins throughout the watershed to reduce or eliminate toxicity of water and sediment in Delta channels.

G. Reduce loadings and mobilization of contaminants and metals to reduce body burdens of contaminants and metals in higher trophic aquatic organisms as necessary to eliminate human health risks from eating these organisms.

H. Manage exploitation rates and associated mortality of wild stocks of Sacramento and San Joaquin salmon.

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Associated Triggers for Programmatic Actions

ADAPTIVE MANAGEMENT, AND TRIGGERS.

Monitoring will be conducted to assess the success of individual restoration actions and ultimately the CALFED Program in its ability to restore fisheries. For each programmatic action discussed above, the monitoring program would conceptually be designed to provide answers to the following questions:

- What measures have been taken to restore fisheries?
- How adequate are the measures?
- How are the actions affecting target species, and are there any unexpected adverse effects on other species?

The monitoring results will be used to "trigger" implementation of adaptive management measures necessary for fishery restoration. The monitoring and adaptive management program would thus guide individual actions taken for fisheries, and provide information to determine whether a through-Delta alternative will be sufficient to restore fisheries. Suggested questions related to each programmatic action that could be formulated as triggers are include in the table below:

Action	Questions to formulate triggers for DEFT programmatic actions
A	• Did we create a wide range of habitat? • What types and quantity of habitats have we created? And how is the habitat changing over time? • Did the species we targeted use that habitat?
B	• Did abundance and diversity of primary and secondary trophic levels improve? • Did food uptake (gut fullness) and growth rates increase?
C	• What fraction of the population is being lost to entrainment?
D	• Did we improve survival of fish? • Did we improve lower level productivity?
E	• Did migration success increase?
F	• Are fish and other aquatic organisms suffering from acute or chronic toxicity?
G	• Are fish and other aquatic organisms safe to eat? • Are body burdens of toxins decreasing in fish?

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Action	Questions to formulate triggers for DEFT programmatic actions
H	• Are exploitation rates and associated mortality satisfactory for wild stocks?

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DEFT Recommended Actions for Stage 1 Implementation

The DEFT team recommended Stage 1 actions include actions identified in the Common Program, CVPIA program, and actions developed specifically by DEFT. Actions are described below by category.

Structural Changes:

1. A new Hood Diversion Demonstration/Testing Facility on the Sacramento River capable of diverting up to 2,000 cfs from the Sacramento River to the Mokelumne River. The facility would have an alignment as defined for Alternatives 2 and 3, so that those options would not be precluded in the future. Screen operation would be under criteria established by NMFS, FWS, and DFG. The facility would be operated for the following purposes:

   i. Test screening efficiency, cleaning and bypass mechanisms (Programmatic Action: D).
   ii. Test upstream passage mechanisms (Programmatic Action: E).
   iii. Enable closing the Delta Cross Channel without compromising interior Delta water quality (Programmatic Action: C).
   iv. Improve Delta water quality (Programmatic Action: F).
   v. Improve cues for migrating fish (Programmatic Action E).

   This action also has some potential negative effects:
   - Exposes young salmon to a new screen system
   - May impair cues of migrating fish
   - May block or impair upstream passage of migrating fish

2. A Barrier at the Head-of-Old-River. The facility will be used for the following purposes:

   i. Improve San Joaquin salmon survival (Programmatic Action E).
   ii. Improve water quality in lower San Joaquin River below the Barrier (Programmatic Action F).

   This action also has some potential negative effects:
   - May impair upstream migration of San Joaquin salmon in the fall
   - May increase entrainment of organisms living in the central and southern Delta

3. A new Tracy Demonstration/Testing Fish Screen and Handling Facility capable of screening 2,500 cfs at 0.2 fps through-screen velocity and 5,000 cfs at 0.4 fps through-screen velocity. Screen operation would be under criteria established by NMFS, FWS, and DFG. The facility would be operated for the following purposes:

   i. Will improve survival of salvaged fish at the Tracy pumping plant (Programmatic

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Action C).

ii. Will reduce entrainment at the Tracy pumping plant (Programmatic Action C).

iii. Will provide valuable information for design of future fish facilities (Programmatic Action C).

This action also has some potential negative effects:

- There may be some stranded costs if the point of diversion is moved sometime in the future.

4. A new Clifton Court Screen and Handling Facility at the northeast entrance to Clifton Court Forebay capable of screening 6,000 cfs at 0.2 fps through-screen velocity and 12,000 cfs at 0.4 fps through-screen. Screen operation would be under criteria established by NMFS, FWS, and DFG. There two primary options to consider:

- Design the screens and low head pumping facilities to screen 6,000 cfs at 0.2 cfs approach velocity. For pumping above 6,000 cfs use a combination of the screens and the existing intake gates. Operate both the salvage facilities at the new screens and at Skinner.

- Design the screens with the capability to operate at 0.2 to 0.4 fps approach velocity and the low head pump station at 10,300 cfs. To achieve the 10,300 cfs capacity through the new screens at particular times, the approach velocity would be increased to accommodate the total flow (approach velocity around .33 cfs).

DEFT recommends that the facility be designed not to preclude either option and to continue with the research at UC Davis Treadmill and the Research work at Tracy to help guide the use of flexible criteria. The facility would be operated for the following purposes:

i. Improve survival of fish in the south Delta near the State export pumping plant (Programmatic Action D).

ii. Reduce predation of fish in Clifton Court Forebay (Programmatic Action D).

iii. Provide constant export rates (less gulping) to reduce disruption of fish migrations (Programmatic Action E) and reduce exposure of fish residing in or migrating through the central and south Delta to entrainment (Programmatic Action C).

This action also has some potential negative effects:

- There may be conflicts with higher pumping rates (e.g., over pumping screens or exporting water that is not first screened).

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Operational Changes

5. Allow higher or lower export rates and changes to export-to-inflow ratios other than those prescribed by Water Quality Control Plan. Shift pumping rates seasonally and on a real-time bases such as reducing pumping when inflow is low or fish are present in large numbers, or increasing pumping when outflow is high or few fish are present in the south Delta. Greater flexibility, both seasonally and in real-time may be possible through identification of water to be committed to an environmental water account which could be accommodated through appropriate increases in export rates. Descriptions of how such an environmental water account might function are described in David Fullerton's memo to the NoName Group of September 17. The export rates would be altered for the following purposes:

   i. Reduce entrainment (Programmatic Action: C).
   ii. Improve foodweb productivity (Programmatic Action: B).
   iii Protect fish migrating through the Delta (Programmatic Action E).

   This action also has some potential negative effects:

   - Impacts may shift to other species or life stages.
   - May locally impact water quality.

   The export rates would be managed in the following ways:

   Seasonally:
   - More restrictive at times for environment.
   - Less restrictive at times for environment.
   - Shift high pumping to seasons of high flows, especially high San Joaquin flows
   - Shift high pumping to seasons of low fish sensitivity

     Current requirements in the WQCP and Biological Opinions require seasonal adjustments in operations, modified by hydrological patterns. Further protection to allow recovery may need to expand on these tools. Seasonal shifts in operation are most appropriate for conditions that occur predictably or where the times of sensitivity overlap for several species. Examples of such seasonal responses that the DEFT team has considered include: increasing the period of the Vernalis Adaptive Management Program from 31 to 60 days and relaxation of the Export/Inflow ratio to 75% in August and September

   Real-Time Flexibility-Monitoring Response:
   - More restrictive at times for environment.
   - Less restrictive at times for environment.
   - Shift high pumping to periods of high flows, especially high San Joaquin flows
   - Shift high pumping to periods of low fish sensitivity

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6. Modify flow volumes, distributions, frequency, and pathways. Flows may be changed by altering inflows, exports, barriers (e.g., DCC, Head of Old River barrier, Montezuma Slough salinity barrier, etc.). Flow would be altered for the following purposes:

   i. Reduce entrainment (Programmatic Action: C).
   ii. Improve foodweb productivity (Programmatic Action: B).
   iii. Improve fish migrating cues (Programmatic Action: E)
   iv. Protect fish migrating through the Delta (Programmatic Action E).
   v. Improve fish habitat - (e.g., alter salinity, water temperature, inundate floodplain) (Programmatic Action A).
   vi. Improve water quality - (e.g. reduce concentrations of toxins, areas of low dissolved oxygen) (Programmatic Action F).

   This action also has some potential negative effects:

   - Impacts (such as water temperature) may shift to other species or life stages either in-Delta or upstream.
   - May locally impact water quality.

Habitat Actions

The following are specific Stage 1 habitat restoration actions that address Programmatic Action A.

7. Restore tidal freshwater, riparian and seasonal and permanent wetland habitat in the area of the proposed Yolo Bypass National Wildlife Refuge including Prospect, Liberty, and Little Holland island-tracts, and tidal portions of the Yolo Bypass.

8. Create large areas of shallow tidal wetland habitat in the vicinity of Suisun Bay, Sherman Lake, and Big Break.

9. Restore and rehabilitate riparian and SRA habitat along all practicable reaches of major fish migration corridors including the Sacramento River, the San Joaquin River, Georgiana Slough, and Steamboat Slough.

10. Restore and rehabilitate riparian, SRA, tidal freshwater, and seasonal and permanent wetland habitats along the North and South Forks of the Mokelumne (including dead-end sloughs of the Eastern Delta) to bolster migration and rearing of salmon from the Mokelumne and Consumes rivers.

11. Restore the habitat corridor of the lower Consumes and Mokelumne rivers within and above the Delta including floodplain, riparian, SRA, and wetland habitats to bolster salmon populations in these rivers.

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12. Restore a large area of tidal freshwater, riparian, and marsh habitat in the South Delta as a pilot project to test concept of "interceptor habitat".

13. Restore tidal freshwater, riparian, and marsh habitats along the lower San Joaquin River between Stockton and Mossdale as a pilot project to test tidal river floodplain restoration.

14. Restore freshwater, riparian, SRA, and marsh habitats in the floodplain of the Sacramento River below Sacramento as a pilot project.

15. Restore Frank's Tract's fish habitat values including creation of a broad expanse of shallow water and wetland habitats within the tract.

16. Evaluate habitat restoration options in the non-tidal portion of the Yolo Bypass that are consistent with its present flood control and agricultural uses.

Harvest Actions

The following are specific Stage 1 habitat restoration actions that address Programmatic Action H.

17. Explore "bubble fisheries" to protect weak stocks. Requires unique genetic markers to identify weaker wild stocks.

18. Evaluate the feasibility of restricting harvests of weaker stocks by expanding existing restrictions in fishing times and locations for winter run salmon to other weaker stocks including spring-run and San Joaquin fall-run. Requires expanded tagging and recovery program, cwt tag recovery data analysis, and DNA microsatellite marker analysis.

19. Evaluate the feasibility of selective fisheries to protect weaker stocks by evaluating marking hatchery fish, restrictions on fishing methods that have high hooking mortality rates, and abundance of hatchery fish at times and locations in coastal and inland fisheries. Requires expanded tagging and recovery program, cwt tag recovery data analysis, and DNA microsatellite marker analysis.

DEFT Future Evaluations

DEFT is proceeding with evaluation of benefits, costs and institutional measures of suggested flexible operations. The DEFT and No Name teams are working together to develop a recommended through-Delta alternative that meets all of the CALFED objectives and principles.

Of greatest concern is continuing exports from the south Delta and the associated entrainment and salvage of important fish species. To address this concern, both teams agree that the key component of a through-Delta alternative should be flexible operations with an environmental water account. Flexible operations offers opportunities to provide the water necessary for actions evaluated by the DEFT team that are essential to minimize entrainment impact of a through-Delta alternative. We recognize that there will be risks to both water supply and the environment with this approach, but that the approach is consistent with the adaptive management framework adopted for CALFED particularly during Stage 1 (see Draft Strategic Plan).

The following describes further the concept of flexible operations and what steps the teams plan to take to further develop the concept.

Examination of patterns of fish salvage at the CVP and SWP fish facilities demonstrate the sometimes episodic nature of entrainment losses. The intermittent occurrence of high losses suggest it may be possible to reduce entrainment impacts through relatively brief but substantial reductions in export pumping. Unlike habitat or water quality actions, the impacts of entrainment are often quite species-specific.

Fish salvage and other fish distribution data from the Interagency Ecological Program's Real Time Monitoring may be used more extensively than in the past to reduce entrainment problems by reducing exports on a daily or weekly basis in relation to monthly standards when the selected species are perceived to be at short -term risk. Such operations will require reliable short-term monitoring data (such as has been provided by IEP in the last three years), a rapid response mechanism for adjusting the CVP/SWP export operations, and agreement on a reasonable limitation on the size, frequency and duration of export alterations. This process could occur without change to the 1995 Water Quality Control Plan by taking advantage of the little-used option to change daily export rates above and below the required longer-term targets.

Salvage data have been used to explore the potential for this approach. Other real-time data would be appropriate to use in conjunction with salvage data to anticipate peak salvage events and detect when risk is likely to decrease.

Modeling this approach to operations will be difficult in part because the frequency of loss events that would instigate a rapid short-term operations adjustment is predicted based on historic salvage information. Particle tracking and DSM outputs will allow some estimation of the protective value to fish of short-term export restrictions but cannot account for fish behavior. Water supply effects of such changes in operations cannot be addressed by most of the current modeling tools. Daily models such as Delta SOS Model will probably be useful to estimate water supply impacts but are not comparable to DWRSIM runs of total system operations. Developing ways to make all relevant types of models more realistic and comparable with each other will require substantial effort.

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As an example of the way this tool might develop,

i. The historic salvage data may identify a number of days in each month when each species is typically at risk under different hydrologic patterns
ii. The average number of times when salvage impacts overlap across species can be calculated to weight the number of days for each species
iii. Hydrodynamic modeling might show the duration, degree and frequency of decreases in exports required to achieve a given level of protection under different flow conditions for each species.
iv. The regulatory agencies might then be able to call for export restrictions, consistent with those findings, in order to avoid entrainment rather than having to wait for take limits to be exceeded.
v. On the other days of the month export rates could be relaxed to minimize impacts on deliveries, as long as all other multi-species protection measures are met.

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